Community Network Integration: An approach to alignment of One Health partners for solutions to 'Wicked' problems of antimicrobial resistance

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The concept of One Health has been used as a framework to understand 'wicked problems' for several years. A key feature of One Health involves ***multi-sector and inter-disciplinary collaborative approaches to create solutions*** to achieve shared outcomes. (WHO, 2018). One area that has galvanized the focus of stakeholders from across multiple sectors (e.g. government, industry, NGOs, academia, the media, and the public at large) is antimicrobial resistance (AMR) (WHO, 2018).

AMR thus constitutes a prototypic 'wicked' One Health issue (Wagner et al 2003). As a result of substantial global investment of time, resources and extensive research, stakeholders are becoming extremely adept at describing the depth of complexity around the issue (Sargeant et al 2007). ***Solutions*** to AMR require a highly coordinated and carefully led process for change that everyone can accept.

Solving wicked problems almost invariably requires engagement of multiple network partners, not joined in a hierarchy or vertical organization, but in a distributed or horizontal network (Alford and Head, 2017; Rifkin, 2011; Tapscott, 2008). Network is a term that has many connotations; a simple definition is a group of people (i.e. a human network) coming together to manifest a shared task (van Wijngaarden, de Bont, and Huijsman, 2006). To solve wicked problems, however, such networks must be operational and effective.

The hierarchical networks consist of groups of people linked in enterprises (government, universities, businesses, etc.) where a small number of people at the 'top' use money, power, experience, culture and other levers to motivate others to manifest organizational goals through well-defined lines of authority. Hierarchical networks have, arguably, served us extremely well. Highly focused goals and management processes have created many successful outcomes, but have also created individual and separated compartments without optimal interconnection across industry or content areas. Some characteristics of hierarchical networks include unnecessary internal and external competition, duplication of effort between organizations and selective connectivity. At its core the hierarchical enterprise tends to function primarily as a self-serving entity (Trochim et al 2006). Ironically, we find ourselves now at a point where the very prosperity they have created has in turn helped engender a series of what some call 'wicked problems' that hierarchies alone are unable to solve.

To address these 'wicked problems', we must then turn to the distributed networks: groups of stakeholders (often themselves organized as individual hierarchies) with an interest in a common issue, but often with highly divergent aims and perspectives related to it. **In a distributed network there is no single authority to determine appropriate solutions; rather the partners must work together to create solutions that everyone can accept and translate into action.** Indeed, given the diversity of interest (or, frequently, lack of trust) among at least some members of such networks, there is no opportunity to create such a hierarchy or authority structure. If any major player were to attempt it (e.g. government, business, etc.) at least one other key member would reject the process outright.

To facilitate an effective distributed network in solving wicked problems, the leadership should include a third party governance structure in which all stakeholders are authentically represented. The theoretical and practical process for doing so, referred to as Community Network Integration (CNI), has been developed by Wilson and Rivers (2018) and implemented globally in multiple contexts for various relevant One Health issues including AMR (Guthrie 2018, Wilson et al).

The following are elements of effective enterprises for both hierarchical and distributed networks; the elements probably sound familiar, as they are similar to those used within hierarchical enterprises to optimize their effectiveness**:** *Vision; Leadership; Culture of high emotional energy (hi E); Human Resources; Network engagement; Projects, products, services; Resource acquisition, marketing; and Administrative, Communications, Financial, IT, and other systems.* Applying these elements to a distributed network looks, broadly speaking, like the following. In addition to coherent ***coordination*** of the entire network enterprise, the network thrives under a *coherent vision* that allows all players to manifest their preferred future as they define it. It requires also conscious attention to creating a ***culture of high energy*** including appreciation of self and others, creativity and a focus on abundance and collaboration. It benefits from the equivalent of a ***human resources*** process: for example, to map, expand and engage the network - often through enhanced connectivity and effectiveness of existing network activities and ensuring that each participant is incentivized by ensuring that their needs are met. Forward momentum is created through practical joint ***pilot projects*** and a consistent means to ***resource*** collaborative activities. And it benefits from ***systems*** to support administrative functions, communications etc.

The approach involves applying well-documented principles of social psychology (Wilson 2006; Wilson et al 2018) to create this governance platform. Initial participants are identified who represent different sectors within a network concerned with a specific issue, have a degree of influence within it, and who demonstrate a high propensity for collaboration ("early adopter collaborators"). These individuals are then further engaged in individual dialogue to outline the benefits of greater collaboration, the nature of planned participants and those already involved, previous successes and the process to engage the network. Those interested are then asked to participate in an informal sector-based CNI leadership team.

With this, a cross-sectorial circle of trust is initiated. It is enhanced by bringing the leadership team together, face to face or by teleconference. During these facilitated sector-based CNI team meetings, members are introduced to a code of practice that includes an agreement to listen to others respectfully and to focus on creating solutions where everybody wins. They are also introduced to the single most important element of any creative endeavour: creating a culture of high emotional energy (e.g.: We can do this!). With this, authentic facilitated discussions ensue around the actual needs and perspectives of each participant, and initial low hanging fruit pilot projects that benefit each player (e.g. to identify technical, policy solutions, etc.) are identified.

The following will illustrate application of CNI to AMR including the nonlinear nature of the process and our approach to its management. As it consists of a strategy for operating within complex systems, the approach by its very nature is emergent. That is, although the goals are generally known (e.g. to optimize responses to AMR by alignment of network

stakeholders in a manner in which everyone wins) the details of how that is to happen are not necessarily known at the outset. Indeed, they typically need to be developed collaboratively and innovated as the network moves towards the described objective. And, that goal itself may change as more information is gathered.

We began with a small local team of about 8-10 people having a high level of trust and an interest in improving outcomes for a wide range of One Health issues globally, and a suite of relevant technical, business and social science skills. Through informal discussion and reflection, we identified a number of issues that we were collectively passionate about. Initially these issues included things like AMR, pollinator sustainability, providing entrepreneurial skills to students, and a few others.

In the case of AMR we applied the Seven Step process for CNI described elsewhere (Wilson, Rivers, & Noor 2019). Thus, we began initial mapping of the Canadian AMR network, identifying early adopter collaborators in the process who we knew were interested in the issue (Step 1). Over time, these individuals began inviting us to other geographies (USA, EU, SE Asia, southern, east, central and west Africa). As this ensued, we focused on engagement of key individuals across the network (Step 2). Critical to this was naming and creating a culture of high emotional energy. This, for example, allowed the team to be resilient to initial 'rejections' by late adopters. Also key was communicating a common narrative to the network that everyone could buy into and focusing authentically on the needs of each actor (Step 3). We created leadership teams consisting of about 8-12 engaged early adopters across the networks at various relevant levels of scale (e.g. local, national, multinational etc.). For each of these we explained and began co-implementing the business elements as described above. And we began connecting them to each other.

Various pilot projects were identified at various levels of scale and are currently at different stages (Step 6). Some are at the stage of developing a project level business process (again with the elements identified above). Others (for example national mapping and engagement of the Canadian beef network, implementation of a globally appropriate collaborative IT platform and comprehensive multispecies AI driven diagnostic algorithm) are at the data gathering and prototype phases. Others (generally smaller in scope) have been completed. Again, under the business elements identified above, we focused on reducing costs and sharing resources and expertise. A range of government and corporate partners provided required funding in the early stages. We also developed an initial intern program where students and recent graduates assist pro bono along with others on the team and then assist in identifying resources to support themselves with the help of appropriate mentors. Multiple highly skilled individuals in areas as diverse as microbiology, social media and graphic design have stepped forward to fill these roles and others. As the process grew in complexity, the teams began to create systems (e.g. financial, project and outreach management etc.) to facilitate further growth and to connect network players regionally and globally under a common, fractal management framework (Step 7). All of this continues to be emergent with multiple additional players, networks and issues continually being added to the process (Wilson and Rivers, 2019).

You can think of CNI as a practical process to operationalize One Health within the emerging Collaborative Economy. We welcome your questions and comments and invite you to join us as we work together to turn these wicked problems into delightful solutions. For more information, please see: https://www.youtube.com/watch?v=bdgEpo8_JC8.

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